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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Alexander Conrad

Serial No. 08/421,810 Examiner: E. Holloway III

Filed April 13, 1995 Group Art Unit 2735

Entitled: INTELLIGENT LOCATOR SYSTEM

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Pittsburgh, Pennsylvania 15219
February 8, 2001

Assistant Commissioner for Patents
Box Patent Appeal - Fee
Washington, D.C. 20231

BRIEF FOR APPELLANT

Sir:

Attached hereto is the Brief for Appellant in triplicate together with the Government Fee of $155.00.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Box Patent Appeal - Fee, Washington, DC 20231 on February 8, 2001

Linda C. LaCone

Date: February 8, 2001

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Pittsburgh, Pennsylvania 15219
February 6, 2001

Hon. Commissioner of Patent and Trademarks
Box Patent Appeal
Washington, DC 20231

BRIEF FOR APPELLANT

Sir:

1. Real Party in Interest

The real party in interest is Dwyer Precision Products, Inc. of Jacksonville, Florida.

2. Related Appeals and Interferences

There are no related cases in appeal or in interference.

3. Status of Claims

Claims 49-77, 79, 80, 82-87, 89, 90, 92-97, 99 and 100 have been finally rejected pursuant to an Official Action of June 8, 2000.

4. Status of Amendments

There have been no amendments subsequent to the final rejection.

5. Summary of Invention

The invention provides an intelligent locator system useful for tracking and locating persons and equipment in a facility such as a hospital or persons and/or product and equipment in a factory, warehouse, retail store or other space. (Page 9, lines 9-17) As illustrated

in Figure 1, the system is made up of a central control computer which is labeled ILC (intelligent locator computer) and identified by reference numeral 2. The computer is connected by bus lines 4_1, 4_2...4_n to up to 32 ILA's (intelligent locator arbitrators) identified by reference numeral 6_1, 6_2---6_{32}. (Page 9, lines 17-25) Each ILA is connected by a serial bus 8 to up to 32 ILR's (intelligent locator receivers) 16_1, 16_2---16_{32} that are powered by the power supply 14 through lines 10 and 12. (page 10, lines 6-16) Completing the system is a plurality of ITL's which are infrared transmitter badges 18_1, 18_2---18_N each of which transmits a unique bit code which when chosen with 20 bits enables up to 1,048,876 badges to be uniquely recognized by the system. (Page 10, lines 16-22)

The badges 18 are suitable to be worn by persons, animals and/or equipment for infrared transmissions of the unique identification code of each badge. The receivers 16 with infrared detectors are installed in walls, floor, ceilings, structural members and special mountings in a facility to allow detection of the unique code emitted by the badges. The arbitrators 6_1, 6_2---6_{32} process the signals from the receivers to determine the unique identification code which is then sent to computer 2 along with start and stop events. The computer "time-stamps" the events and stores the data. (Page 11, lines 1-25) The believed patentable invention is directed to the transmission of coded pulse bursts at diverse time intervals during predetermined time intervals for preventing synchronization with resident signals in a facility, and decoding of received pulse bursts to establish the location of the transmitter in the facility. (Page 4, lines 17-23)

Figure 3 illustrates timing diagrams of three simultaneous infrared transmissions by three separate transmitters over a four-second period. A pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its

position in time relative to the start of each second determined by an algorithm. As an example, when the code bursts 40 of all three badges line up at time 0 and thus interfere with one another as depicted at the far left of Figure 3, then during the next second no two pulses will simultaneously occur or line up in time because the pulses emitted by their respective transmitters occur in time according to a different code. (Page 14, lines 5 through page 15, line 22) An algorithm resident in the software of a microcontroller, part of the transmitter 18 is used to determine when within each second the unique identification code is transmitted by infrared pulse bursts. (Page 15, lines 10-14)

The algorithm accesses a 20 bit identification code at a rate of 1 bit per second with a bit value of "0" or "1" to establish in which half of the current second the code burst is to be transmitted. The algorithm also steps through the 20 bit identification code at a rate of 4 bits at a time during each second using a current 4 bit part of the code to determine when the pulse bursts are to be transmitted within that first or second half of a second. (Page 15, lines 14-23)

As depicted in Figure 4, the pulse bursts, each with a duration of 20 milliseconds (which was arbitrarily selected) are made up of 14 infrared pulses 42 each with a duration of 10 microseconds. The 20 millisecond burst transmission is made up of three components. The first component is a start bit interval 46 during which an initial pulse 42 occurs to synchronize the receiver 16 for reading the transmission. The second component is 10 pulses occurring during an interval 48 representing a 20 bit code. The third component is three pulses 42 representing a 6 bit checksum occurring during interval 50. The checksum is detected, and used, by a receiver 16 to insure integrity of the received data. (Page 16, lines 1-17)

Figure 5 illustrates a pulse position scheme used to represent 2 binary bits by the

transmission of 1 infrared pulse transmission 42. The scheme is utilized to minimize a battery drain each 10 microseconds duration of an infrared pulse represents an admission of a pulse occurring sometime during a 1.5 millisecond bit space 52. The bit space is defined to provide four (4) discrete time intervals into which a pulse can occur. A 2 binary bit code 00 is represented when the pulse occurs in the first of the four intervals. A 2 binary bit code 01 is represented when the pulse occurs in the second of the four intervals. A 2 binary bit code 10 is represented when the pulse occurs in the third of the four intervals. A 2 binary bit code 11 is represented when the pulse occurs in the fourth of the four intervals. (Page 16, line 18 through page 17, line 22)

Figure 6 illustrates schematically the circuitry of the transmitter 18 which includes a microcontroller 70 comprised of an IC package containing a programmable memory for an operating program whose function is to define an unique 20 bit identification code for uniquely identifying the transmitter from among all other transmitters and other possible sources of infrared pulse emissions occurring within the receiving range of the receivers 16. (Page 18, lines 6-14) A serial bit stream of 125 microseconds wide logic pulses are output on data line 74 to a monostable multi-vibrator 80 which produces an output on line 81 in the form of pulses, each having a width of 10 microseconds, for transmission which turns ON a MOSFET transistor 82. Infrared light emitting diodes 84A and 84B are energized when transistor 82 is turned ON. Resistor 76 and capacitor 78 form an R-C circuit which determines the 10 microsecond pulse width output by multi-vibrator 80. (page 18, line 21 to page 19, line 1)

Figures 7 and 8, illustrate the circuitry for the infrared receiver which includes a diode receiver called a Pin photodiode 118 to detect impinging IR energy emitted by the diodes 84A and 84B of the IR transmitters. (page 20, lines 12-14) A pulse output by the diode 118,

having a duration of 10 microseconds, is converted by preamplifier 126 to a logic pulse of approximately 50 to 300 microseconds in duration (page 21, lines 9-13) which is applied by line 110 through a voltage level conversion circuit shown in Figure 9. The voltage level conversion circuit includes voltage level resistors 162 and 164 coupled to the gate of transistor 168 to provide a +5 VDC pulse to microcontroller 158, uart (universal asynchronous receiver transmitter) and a serial data transceiver 148. (page 22, lines 15-20) Sampling of the input bursts by the microcontroller 158 is used to establish the validity of the identification code which is illustrated in Figure 4 and as discussed previously, consists of a start pulse followed by ten pulses representing a 20 bit code followed by three pulses representing a six bit checksum. (page 22, lines 20-25) A believed novel feature of the invention is to provide an operating program for the microcontroller to utilize bursts from the received identification code to recalculate a checksum and then compare the freshly recalculated checksum with the checksum received with the identification code. When the freshly recalculated checksum equals the checksum received with the identification code the validity of the code is established. In this way, when too few or too many code bursts are detected, the transmissions are ignored. (page 23, lines 1-14) The uart 156 is an integrated circuit that converts parallel data from microcontroller 158 to serial data output at a selected baud rate to the integrated circuit 148 which delivers serial data output to differential outputs 8A and 8B for transmission over a twisted wire pair. (page 24, lines 5-23) When a validated code is established, a signal is sent to the intelligent locator arbitrators 6_1, 6_2, - - - 6_{32} by serial bus 8. (page 23, lines 15-19)

In Figure 11 there is shown the circuitry of an intelligent locator arbitrator (ILA) 6 which includes a microcontroller 222 having a resident program to read identification codes

reported by each ILR receiver 16 every time a code transmitter 18 is carried into the detection range of a receiver 16. The microcontroller sends a start event message containing the identification code and an identification number of the receiver. The microcontroller contains static RAM to store the identification code in a table of information for that particular receiver and continues the storage until the receiver stops reporting the identification code for more than ten seconds. The microcontroller then sends a stop event message to the computer and the identification code is removed from the static RAM. (page 27, lines 18 to page 28, line 6). Operating software in the CPU 228 receives the start and stop events from the arbitrators, time-stamps the events and stores the events in the data base. The storage of the start event includes an identifying number of the receiver, the identification code of the transmitter, and the real time of the occurrence of the start event. The storage of the stop event includes the identifying number of the receiver, the identification code of the transmitter that is removed from the reception area of the receiver, and the real time of the occurrence of the stop event. (page 29, lines 9-19) A report can be obtained from the central computer using the keyboard for access in a printer. (page 28, line 23 through page 30, line 5)

6. Issues

The broad issues presented in this appeal are whether claims are supported by the disclosure of the present invention and whether the differences between the subject matter of the present invention and the prior art references are such that the subject matter of the present invention, taken as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art.

More particularly, there is one issue of sufficiency of disclosure under 35 USC

§112 and two issues as to whether under 35 U.S.C.§103 the present invention is obvious and unpatentable. The first issue is whether claims copied from Patent No. 5,627,524 are supported by the disclosure found in applicant's specification, claims and drawings to provoke an interference. The first issue of obviousness, is whether the present invention is unpatentable over the Guest 4,990,892 patent in combination with Mufti 5,363,425 and Haner 3,403,381 patents. The second issue of obviousness is whether the present invention is unpatentable over the same references identified in the first issue and further in view of Warren 5,206,637 patent and pages 5-2 and 5-12 through 5-15 of a book entitled Understanding Data Communications by Radio Shack.

7. Grouping of the Claims

Appellants' claims do not stand or fall together. Appellants wish to group the claims of the present application for the purpose of this appeal as follows: :

Group I - Claims 49, 50, and 53-65

Group II - Claims 51 and 52

Group III - Claims 66-71

Group IV - Claims 72-77, 79, 80, 82-87, 89, 90, 92-97, 99 and 100

Separate Patentability of Group I Claims

As to this Group of claims and the references applied against them, nothing in the references makes obvious the invention as a whole.

Group I claims consisting of claims 49, 50 and 53-65 are patentable based on the recitation in claim 49 calling for:

> "means responsive to an algorithm for controlling said means for transmitting said infrared pulse bursts during a predetermined time interval, with the occurrence of each pulse burst in time relative to the start of each time interval varying from time

interval to time interval, the amount of said varying being controlled by said means responsive to an algorithm incorporated in each transmitter using said unique binary identification code of that transmitter for preventing synchronization with other transmitters and with ambient periodic resident signals in the facility"

Guest, Mufti and Haner references do not teach the use of an algorithm to vary the start of a pulse burst from time interval to time interval to prevent synchronization with other transmitters.

Separate Patenability of Group II Claims

As to this Group of claims and the references applied against them, nothing in the references makes obvious the invention as a whole.

Group II claims consisting of claims 51 and 52 are patentable based on the recitation by claim 51 defining that the means for transmitting pulse bursts include a microcontroller having memory containing said binary identification code which is used by the transmitter to vary the start of pulse bursts in successive time intervals. Guest, Mufti, Haner and Warren references do not teach the use of an algorithm to vary the start of a pulse burst from time interval to time interval to prevent synchronization with other transmitters.

Separate Patenability of Group III Claims

As to this Group of claims and the references applied against them, nothing in the references makes obvious the invention as a whole.

Group III claims consisting of claims 66-71 are patentable based on the recitation claims 66 calling for

"each pulse burst to include a position scheme to represent at least two binary bits of the identification code with one pulse for reducing the number of pulses required to represent said unique binary identification code".

Guest, Mufti, Haner and Warren references do not teach the use of a pulse position scheme to

represent two binary bits.

Separate Patenability of Group IV Claims

As to this Group of claims consisting of claims 72-77, 79, 80, 82-87, 89, 90, 92-97, 99 and 100 are supported by the disclosure of applicant's specification in accordance with 35 USC §112 and are thus patentable to the applicant. The notion that applicant's receiver cannot detect more than one badge in a room, containing the receiver, files in the face of the use of the binary identification code used inter ally to prevent synchronization with other transmitters and with ambient periodic resident signals in the facility.

8. Argument

Fundamental to Appellant's claim to invention in Group I claims 49-64 is the recitation dealing with the formation of infrared pulse bursts that uniquely occur to prevent synchronization with other pulse bursts that can be detected by the same detector in a facility. The relevant claim language in claim 49 is:

> "means responsive to an algorithm for controlling said means for transmitting said infrared pulse bursts during a predetermined time interval, with the ocurrence of each pulse burst in time relative to the start of each time interval varying from time interval to time interval, the amount of said varying being controlled by said means responsive to an algorithm incorporated in each transmitter using said unique binary identification code of that transmitter for preventing synchronization with other transmitters and with ambient periodic resident signals in the facility"

and the relevant in claim 65 is:

> "an algorithm unique to and with that transmitter means for controlling said controller means for producing emissions of infrared pulse bursts by said infrared emitting means for defining a unique binary identification code at diverse times during each of predetermined time intervals, said algorithm controlling said controller means for causing each pulse burst in each successive time interval relative to the start of each of the successive time intervals to occur differently from time interval to time interval"

Claims 49-65 have been rejected based on the contention that the Guest transmitter could obviously be made to function in response to an algorithm or software alleged to be disclosed by Mufti. In support of the combination of references it is contended that a software programable device is easier and cheaper to mass produce and provides flexibility because the software can be modified to provide different functions. An alternative was advanced that Mufti could be modified to send infrared bursts described by Guest and which would be an advantage over RF transmission as not requiring FCC licensing. Appellants' specification is silent about any issue of FCC licenses which points out the incompatibility of the combination of Guest and Mufti.

The argument of this rejection is clearly based on the impermissible hindsight reconstruction of applicant's claimed invention as there is clearly no basis in the references themselves to support the combination. The argument of the rejection fails to advance any reason why one would modify the references particularly the modifications to do something the references do not even merely suggest.

The Guest reference, which is owned by the Appellant and the forerunner of the Appellant's present invention, while transmitting infrared pulse bursts was severely limited by reason of the resistor-capacity combinations which select the number of pulses that can be transmitted during a pulse burst. The Guest system was used to only identify classes of individuals. The identity of an individual could not be determined. From column 11, at line 30, the identity of each class is defined by a train of pulses and the example given describes that the pulse trains are of one of three frequencies. The pulse train at the specific frequency was transmitted during specific bursts periods. (column 11, lines 44-48) The notion of using an algorithm unique to the badge to control the times when pulse bursts occur during regular

intervals is neither disclosed or suggested by Guest. To combine references the obviousness of the combination of references must come from the references themselves not from the impermissible hindsight use of Appellant's invention. In rejection it is contended that Mulfti discloses an algorithm or software but no such disclosure can be found. Mulfti discloses at column 8, RF bursts, not IR, having a basic structure shown in Figure 9. The random intervals at which RF bursts are transmitted as best understood is found in column 8, lines 18-22:

> "In order to reduce the possibility of fraud on the system, the transmitter units in the asset tags and ID badges make use of a counter increase the sequence number by one each time a tag or ID badge sends out a new burst."

The circuitry as shown in Figures 5 and 7 and while there is a microcontroller there is no disclosure of an algorithm or even more importantly of the use of an algorithm as the control for varying the time interval between successive bursts and further that the means which is responsive to the algorithm is also response to the unique binary identification code. Mulfti uses only an ID code and no algorithm whereby the Mulfti system is limited to the capacity of the ID code for distinguishing between the badges. The Mufti system requires the transmission of FR signals which are not limited to the line of sight whereas infrared is so limited. Thus, the Mufti system, unlike the Appellants and Guest, will always respond to all badges in the facility and must distinguish amongst all badges whereas the Appellant's system need only distinguish among badges within line of a given receiver. There is no basis to support the argument of the rejection that it would be obvious to use IR in the Mufti system to avoid FCC regulations. The fact remains that the Mufti disclosure does not suggest IR transmissions. The rejection continues by contending that it would have been obvious to randomly specify the transmission intervals as suggested by Haner.

The reliance on Haner for outputting a pulse at random times is wholly misplaced as far as Appellant's claims. Random outputting is not part of Appellant's invention and claims 49 and 65 as noted supra specifies that it is the algorithm that controls the transmission of infrared pulse bursts during predetermined time intervals with the occurrence of each burst in time relative to the start of each time interval varying with time interval to time interval the amount of said varying being controlled by said means responsive to an algorithm. Similar language was noted supra in regard to claim 65. There is nothing random about the transmissions in Appellant's invention and therefore the teaching of random transmissions by the disclosure by Hanent particularly for the purposes advanced in the rejection.

Appellant argues that there is a lack of motivation to combine such references. As stated in In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986) and recently affirmed in In re Hans Oetker 24 USPQ 2d 1443, in order to rely on a reference as a basis for rejection of the Appellant's invention, the reference must either be in the field of Appellant's endeavor, or if not, then be reasonably pertinent to the particular problem with which the inventor was concerned such that a person or ordinary skill in the art would reasonably be expected to look in that field for a solution to the problem facing the invention. In addition, In re Oetker states that where there is a combination of references from non-analogous sources, there must be some reasons, suggestion or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. Appellants also direct attention to in In re Fritch, 972 F.2d 1260, 23 USPQ 1780 (Fed. Cir. 1992) where the court indicated it is impermissible to use the claimed invention as an instruction manual or "template" to piece together isolated disclosures and teachings of the prior art so that the claimed invention is

rendered obvious. And further that references must suggest a desirability of and thus the obvious of the modifications proposed by the examiner in the rejection now under appeal. It is apparent the rejection clearly uses Appellants claims as a template for the rejection.

Absent of a disclosure or even a suggestion in the reference of the desirability of the combination set forth in the rejection claims 49 and 65 is based on improper hindsight use of appellants own invention as the teaching for reconstructing the references. To establish a prima facia case of obviousness supporting the rejection of the claims the rejection must provide a factual basis founded in objective teaching of the cited references leading to a legal conclusion of obviousness. *In re Fine*, 5USPQ2d 1596 (Fed Cir. 1988); and *In re Lalu*, 223 USPQ 1257 (Fed Cir. 1984). The Federal Circuit reiterated in *In re Fine*:

"[t]o imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." 5 USPQ2d at 1600 quoting from *W.L. Gore,* 220 USPQ 303, 312-313 (Fed. Cir. 1983)

The issue before the Board in the present case, the rejection has fundamentally failed to identify any objective teaching or suggestion by the references to support the conclusion of obviousness.

The second issue of obviousness presented by as a second statement of rejection expands the combination of references to additionally include the Warren reference and select pages from a book by Radio Shack. The Warren reference is to a programmable unit for an electronics locking system for a storage unit. The second issue relies on this reference for the proposition that if appellants claims are interpreted to require a microcontroller with a memory and microcode, then the Warren reference suggests the obviousness to include ID stored in memory associated with the microcontroller. For reasons given supra, there simply is no

reasonable basis found in the Warren reference that would suggest the obviousness to modify the teaching of an already improper combination of references, namely, Guest, Mufti and Haner with the Warren reference simply because the Warren reference discloses a microcontroller per se for storing access codes.

The claims comprising Group II (claims 51 and 52) are believed to patentably distinguish over the references in the two issues by the additional recitation in these claims of a microcontroller having a memory containing the unique binary identification code forming part of the transmitter that is responsive to the algorithm. The argument of the rejection contends only that Mufti fails to specify a memory containing the unique address in the microcontroller. The Warren reference is relied upon because it per se describes a microcode. Warren addresses programming an electronic lock used to control access to a storage unit which disclosure has nothing to do with controlling infrared pulse bursts to vary the start of pulse burst in successive time intervals in response to an algorithm stored in the microcontroller of the badge to prevent synchronization with other transmitters. The reliance on the Warren reference is tantamount to nothing more to a catalog listing of semiconductor devices, clearly evidences the use of Appellants claims as a "template".

The claims 66-71 comprising Group III call for the pulse position scheme in which at least 2 binary bits of the identification code are identified by 1 pulse and were rejected by expanding the four (4) references (Guest, Mufti, Haner and Warren) to include the Radio Shack reference. The Radio Shack reference has been relied upon only for a per se showing that multiple bits per baud can increase the signaling rate on a channel. The pulse positioning scheme is then rationalized as obvious contending that 2 bits can be modulated as a pulse or a sound wave

depending on the phase shift of the wave shown in Table 5-4 or 5-6. The argument is clearly hindsight since in fact the sole purpose of the pulse position scheme is to reduce not increase the information that can be transmitted with a single pulse. Clearly, the Radio Shack reference is not directed to the problem sought to be solved by Appellant. The pulse position scheme is simply not to be found during the combination of the five (5) different references. It has been held that the mere combination of five (5) different references is evidence of an invention and in and of itself suggestive of improper hindsight. It is believed that the pulse position scheme is not understood in view of the rejection. Accordingly, Appellants respectfully repeat the description presented earlier in this brief.

> Figure 5 illustrates a pulse position scheme used to represent 2 binary bits by the transmission of 1 infrared pulse transmission 42. The scheme is utilized to minimize a battery drain each 10 microseconds duration of an infrared pulse represents an admission of a pulse occurring sometime during a 1.5 millisecond bit space 52. The bit space is defined to provide four (4) discrete time intervals into which a pulse can occur. A 2 binary bit code 00 is represented when the pulse occurs in the first of the four intervals. A 2 binary bit code 01 is represented when the pulse occurs in the second of the four intervals. A 2 binary bit code 10 is represented when the pulse occurs in the third of the four intervals. A 2 binary bit code 11 is represented when the pulse occurs in the fourth of the four intervals. (Page 16, line 18 through page 17, line 22)

The claims comprising Group IV are respectfully submitted to be supported by Appellants disclosure. The following is a claim chart to show the support by Appellants' specification in an element by element treatment each of the claims 72-77, 79, 80, 82-87, 89, 90, 92-97, 99 and 100.

Appellant's Claims	Conrad, et al., Serial No. 08/421,810
Claim 72. A locator system comprising	"Referring first now to the block diagram of Figure 1, there is illustrated one form of intelligent locator system according to the present invention--" (page 6, lines 9-11)
a number of individual portable transmitter units,	"A plurality of intelligent locator transmitter badges 18_1, 18_2, 18_3, 18_4- - -18_n" (page 10, lines 18-19)
a number of individual stationary receiver units, and	"Each arbitrator 6_1, 6_2- - -6_{32} communicates by a serial data bus 8_1, 8_2- - -8_{32}, with up to 32 intelligent locator receivers 16_1, 16_2- - - 16_{32}," (page 10, lines 6-8)
central data processing means;	"The intelligent locator system of Figure 1 includes a central control computer such as a Personal Computer having a 386 central processor identified for the purpose of disclosure of the present invention as an intelligent locator computer 2 because of interfacing with allied components of the system." (page 9, lines 18-22)
said transmitter units each comprising infrared transmission means and	"Infrared light emitting diodes 84A and 84B are energized when transistor is turned ON." (page 18, line 26 to page 19, line 1)
programmable microprocessor means such that a unique identity data stream is transmitted by each transmitter unit;	The transmitter 18 includes a microcontroller 70 comprised of an IC package containing a programmable memory for an operating program whose function is to define an unique 20 bit identification code for identifying the transmitter uniquely among all other transmitters and other sources of possible infrared pulse emissions occurring within the receiving range of the receivers 16."(page 18, lines 8-14)
said receiver units each comprising in combination infrared receiving means and	"Preamp board 106 includes Pin photodiode 118 for detecting by impingement infrared pulses 104 emitted by an intelligent locator

programmable microprocessor means remotely separated from said central data processing means such that each said receiver unit has the capability to store multiple said unique identity data streams received from multiple said transmitter units and can communicate said identity data streams to said central data processing means.

transmitter 18."(page 20, lines 12-14)

"For this purpose, the microcontroller 158 includes an operating program to perform an important and believed novel feature of the present invention of causing operation of the microcontroller to recalculate a checksum by using bursts from the received identification code and then comparing the freshly calculated checksum equals the checksum received with the identification code, the code is established as valid"(page 23, lines 1-9)--"When the operation of microcontroller 158 establishes the validity of a received identification code then the microcontroller outputs a signal corresponding to the validated code to the intelligent locator arbitrator 6_1, 6_2- - -6_{32} by way of the RS-485 serial data bus 8.--In the system shown in Figure 2, the arbitrators 6_1, 6_2- - -6_{32} return the nurse level information corresponding to that received identification code to the microcontroller 158 of the receiver."(page 23, lines 15-23) "Each arbitrator 6 operates to establish the event when a transmitter 18 is first detected by a receiver 16 and the event when a transmitter 18 is no longer detected by a receiver 16 and transmits such start and stop events as signals to the intelligent locator computer 2."(page 27, lines 11-15) "The microcontroller 222 also stores that identification code in a static ram 190 and 194 in a table of information for that particular receiver 16."(page 27, lines 23-25) "The arbitrators transmits signals corresponding to these start and stop events to the computer 2."(page 11, lines 15-16) "The operating software of the intelligent locator computer operates to read into the computer memory the start and stop events from the intelligent locator arbitrator's 6, time stamps the events, and stores the data of the event in a relational database."(page

Central

11, lines 21-25)

Claim 73. The system of claim 72, where each said unique identity data stream comprises a stream of digitally pulsed infrared radiation

"In Figure 4 a 20 millisecond time interval is depicted during which 14 infrared pulses, each identified by reference numeral 42, occur with an approximate 10 microsecond duration which is identified by reference numeral 44."(page 16, lines 3-8)

consisting of 16 data bits framed by a pair of start bits and a stop bit.

"The 20 millisecond burst transmission is made up of 3 components. The first is a start bit interval 46 during which an initial pulse 42 occurs to synchronize the receiver 16 for reading the transmission. The second component of the pulse transmission are 10 pulses occurring during an interval 48 representing a 20 bit code. A third component of the pulse transmission, which also comprises an important novel feature of the present invention, are three pulses 42 representing a 6 bit checksum occurring during an interval 50 and detected and used by a receiver 126 to insure integrity of the received data."(page 16, lines 7-17)

Claim 74. The system of claim 72, where each said transmitter unit transmits said identity data stream in a unique non-standard periodic pattern, such that no two said transmitter units transmit with identical periodic patterns.

"It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 10-15)

Claim 75. The system of claim 72, where said transmitter units transmit both vertically and horizontally.

"Diodes 84A and 84B..."(page 19, line 1)

Claim 76. The system of claim 72, where said transmitter unit microprocessor means is programmed to one of 65,535 possible said unique identity data streams.

"All the intelligent locator receivers associated with the various intelligent locator arbitrators are responsive to anyone of at least one but preferably a plurality of

intelligent locator transmitter badges 18_1, 18_2, 18_3, 18_4- - -18_n, each of which, as will be described in greater detail hereinafter, transmits an unique bit code when chosen with bits 20 to enable up to 1,048,576 badges uniquely recognizable by the system." (Page 10, lines 16-22)

Claim 77. The system of claim 72, where said receiver unit microprocessor means test each received said identity data stream for validity.

"The microcontroller 158 samples the input bursts to establish the validity of an identification code. The validation is made when the identification code consists of, as shown in Figure 4, a start pulse 46 followed by 10 pulses 48 representing a 20 bit code, followed by three pulses 50 representing a 6 bit checksum."(page 22, lines 20-25)

Claim 78. The system of claim 72, further comprising a number of slave receiver units connected to individual said receiver units, said slave units comprising infrared receiving means and means to communicate received said identity data streams from said transmitter units to said receiver units, said slave receiver unit having no individual microprocessor means.

"Turning first to Figure 7, there is illustrated by the block diagram two circuit boards, one of which is a preamp board 106, and the other a logic board 108 which are mounted to a single gang face plate for installation in a wall or in a ceiling of a room within the premises of a facility where the system of the present invention operates. Preamp board 106 is mounted directly to the face plate and logic board 108 forms the back board mounted behind the preamp board in a piggy-back fashion. Preamp board 106 includes Pin photodiode 118 for detecting by impingement infrared pulses 104 emitted by an intelligent locator transmitter 18."(page 20, lines 4-14)

Claim 79. The system of claim 72, where each said transmitter unit repeatedly transmit said identity data stream in a unique non-standard periodic pattern consisting of three transmissions with different time intervals between each of said three transmission in said pattern, and where no two said transmitter units have identical time intervals between said three transmissions.

"To facilitate an understanding of the underlying principle of the present invention, reference is now made to the diagram of Figure 3 wherein there is illustrated timing diagrams in graphical form of three simultaneous infrared transmissions by three separate intelligent locator transmitters over a four second period. It is an important and novel feature of the present invention that a

	pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 5-15)
Claim 80. The system of claim 72, where each said transmitter unit repeatedly transmits said identity data stream once during successive predetermined time periods, with the time interval between each two successive transmissions differing from the time interval between the previous two successive transmissions.	"To facilitate an understanding of the underlying principle of the present invention, reference is now made to the diagram of Figure 3 wherein there is illustrated timing diagrams in graphical form of three simultaneous infrared transmissions by three separate intelligent locator transmitters over a four second period. It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 5-15)
Claim 82. A locator system comprising	"Referring first now to the block diagram of Figure 1, there is illustrated one form of intelligent locator system according to the present invention--" (page 6, lines 9-11)
a number of individual portable transmitter units,	"A plurality of intelligent locator transmitter badges 18_1, 18_2, 18_3, 18_4- - -18_n" (page 10, lines 18-19)
a number of stationary individual remote receiver units, and	"Each arbitrator 6_1, 6_2- - -6_{32} communicates by a serial data bus 8_1, 8_2- - -8_{32}, with up to 32 intelligent locator receivers 16_1, 16_2- - -16_{32}," (page 10, lines 6-8)
a central data processing means;	"The intelligent locator system of Figure 1 includes a central control computer such as a Personal Computer having a 386 central processor identified for the purpose of disclosure of the present invention as an intelligent locator computer 2 because of

interfacing with allied components of the system." (page 9, lines 18-22)

said transmitter units each comprising infrared transmission means and programmable microprocessor means such that a unique identity data stream is transmitted by each transmitter unit;

"Infrared light emitting diodes 84A and 84B are energized when transistor is turned ON." (page 18, line 26 to page 19, line 1)

said individual remote receiver units each comprising a single infrared receiving means and a single programmable microprocessor means, such that the total number of said programmable microprocessor means is equal to the total number of said individual remote receiver units in said locator system, such that each said individual remote receiver unit has the capability to store multiple said unique identity data streams received from multiple said transmitter units and can communicate said identity data streams to said central data processing means.

The transmitter 18 includes a microcontroller 70 comprised of an IC package containing a programmable memory for an operating program whose function is to define an unique 20 bit identification code for identifying the transmitter uniquely among all other transmitters and other sources of possible infrared pulse emissions occurring within the receiving range of the receivers 16."(page 18, lines 8-14) "Preamp board 106 includes Pin photodiode 118 for detecting by impingement infrared pulses 104 emitted by an intelligent locator transmitter 18." (page 20, lines 12-14) "For this purpose, the microcontroller 158 includes an operating program to perform an important and believed novel feature of the present invention of causing operation of the microcontroller to recalculate a checksum by using bursts from the received identification code and then comparing the freshly calculated checksum equals the checksum received with the identification code, the code is established as valid"(page 23, lines 1-9)--"When the operation of microcontroller 158 establishes the validity of a received identification code then the microcontroller outputs a signal corresponding to the validated code to the intelligent locator arbitrator 6_1, 6_2- - -6_{32} by way of the RS-485 serial data bus 8.--In the system shown in Figure 2, the arbitrators 6_1, 6_2- - -6_{32} return the nurse level information corresponding to that received identification code to the

microcontroller 158 of the receiver."(page 23, lines 15-23) "Each arbitrator 6 operates to establish the event when a transmitter 18 is first detected by a receiver 16 and the event when a transmitter 18 is no longer detected by a receiver 16 and transmits such start and stop events as signals to the intelligent locator computer 2."(page 27, lines 11-15) "The microcontroller 222 also stores that identification code in a static ram 190 and 194 in a table of information for that particular receiver 16."(page 27, lines 23-25) "The arbitrators transmits signals corresponding to these start and stop events to the computer 2."(page 11, lines 15-16) "The operating software of the intelligent locator computer operates to read into the computer memory the start and stop events from the intelligent locator arbitrator's 6, time stamps the events, and stores the data of the event in a relational database."(page 11, lines 21-25)

Claim 83. The system of claim 82, where said unique identity data stream comprises a stream of digitally pulsed infrared radiation

"In Figure 4 a 20 millisecond time interval is depicted during which 14 infrared pulses, each identified by reference numeral 42, occur with an approximate 10 microsecond duration which is identified by reference numeral 44."(page 16, lines 3-8)

consisting of 16 data bits framed by a pair of start bits and a stop bit.

"The 20 millisecond burst transmission is made up of 3 components. The first is a start bit interval 46 during which an initial pulse 42 occurs to synchronize the receiver 16 for reading the transmission. The second component of the pulse transmission are 10 pulses occurring during an interval 48 representing a 20 bit code. A third component of the pulse transmission, which also comprises an important novel feature of the present invention, are three pulses 42 representing a 6 bit checksum occurring during an interval 50 and detected and used

	by a receiver 126 to insure integrity of the received data."(page 16, lines 7-17)
Claim 84. The system of claim 82, where each said transmitter unit transmits said identity data stream in a unique non-standard periodic pattern, such that no two said transmitter units transmit with identical periodic patterns.	"It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 10-15)
Claim 85. The system of claim 82, where said transmitter units transmit both vertically and horizontally.	"Diodes 84A and 84B..."(page 19, line 1)
Claim 86. The system of claim 82, where said transmitter unit microprocessor means is programmed to one of 65,535 possible said unique identity data streams.	"All the intelligent locator receivers associated with the various intelligent locator arbitrators are responsive to anyone of at least one but preferably a plurality of intelligent locator transmitter badges 18_1, 18_2, 18_3, 18_4- - -18_n, each of which, as will be described in greater detail hereinafter, transmits an unique bit code when chosen with bits 20 to enable up to 1,048,576 badges uniquely recognizable by the system." (Page 10, lines 16-22)
Claim 87. The system of claim 82, where said receiver unit microprocessor means test each received said identity data stream for validity.	"The microcontroller 158 samples the input bursts to establish the validity of an identification code. The validation is made when the identification code consists of, as shown in Figure 4, a start pulse 46 followed by 10 pulses 48 representing a 20 bit code, followed by three pulses 50 representing a 6 bit checksum."(page 22, lines 20-25)
Claim 89. The system of claim 82, where each said transmitter unit repeatedly transmits said identity data stream in a unique non-standard periodic pattern consisting of three transmissions with	"To facilitate an understanding of the underlying principle of the present invention, reference is now made to the diagram of Figure 3 wherein there is illustrated timing diagrams in graphical form of three

different time intervals between each of said three transmissions in said pattern, and where no two said transmitter units have identical time intervals between said three transmissions.

simultaneous infrared transmissions by three separate intelligent locator transmitters over a four second period. It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 5-15)

Claim 90. The system of claim 82, where each said transmitter unit repeatedly transmits said identity data stream once during successive predetermined time periods, with the time interval between each two successive transmissions differing from the time interval between the previous two successive transmissions.

"To facilitate an understanding of the underlying principle of the present invention, reference is now made to the diagram of Figure 3 wherein there is illustrated timing diagrams in graphical form of three simultaneous infrared transmissions by three separate intelligent locator transmitters over a four second period. It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 5-15)

Claim 92. A locator system comprising

"Referring first now to the block diagram of Figure 1, there is illustrated one form of intelligent locator system according to the present invention--" (page 6, lines 9-11)

a number of individual portable transmitter units,

"A plurality of intelligent locator transmitter badges 18_1, 18_2, 18_3, 18_4- - -18_n" (page 10, lines 18-19)

a number of stationary individual remote receiver units, and

"Each arbitrator 6_1, 6_2- - -6_{32} communicates by a serial data bus 8_1, 8_2- - -8_{32}, with up to 32 intelligent locator receivers 16_1, 16_2- - -16_{32}," (page 10, lines 6-8)

a central data processing means;

"The intelligent locator system of Figure 1

includes a central control computer such as a Personal Computer having a 386 central processor identified for the purpose of disclosure of the present invention as an intelligent locator computer 2 because of interfacing with allied components of the system." (page 9, lines 18-22)

said transmitter units each comprising infrared transmission means and programmable microprocessor means such that a unique identity data stream is transmitted by each transmitter unit;

"Preamp board 106 includes Pin photodiode 118 for detecting by impingement infrared pulses 104 emitted by an intelligent locator transmitter 18."(page 20, lines 12-14)

said individual remote receiver units each comprising a paired single infrared receiving means and single programmable microprocessor means, said single programmable microprocessor means being in communication with only one said individual remote receiver unit, such that each said individual remote receiver unit has the capability to store multiple said unique identity data streams received from multiple said transmitter units and can communicate said identity data streams to said central data processing means.

"For this purpose, the microcontroller 158 includes an operating program to perform an important and believed novel feature of the present invention of causing operation of the microcontroller to recalculate a checksum by using bursts from the received identification code and then comparing the freshly calculated checksum equals the checksum received with the identification code, the code is established as valid"(page 23, lines 1-9)--"When the operation of microcontroller 158 establishes the validity of a received identification code then the microcontroller outputs a signal corresponding to the validated code to the intelligent locator arbitrator 6_1, 6_2- - -6_{32} by way of the RS-485 serial data bus 8.--In the system shown in Figure 2, the arbitrators 6_1, 6_2- - -6_{32} return the nurse level information corresponding to that received identification code to the microcontroller 158 of the receiver."(page 23, lines 15-23) "Each arbitrator 6 operates to establish the event when a transmitter 18 is first detected by a receiver 16 and the event when a transmitter 18 is no longer detected by a receiver 16 and transmits such start and stop events as signals to the intelligent locator computer 2."(page 27, lines 11-15) "The microcontroller 222 also

stores that identification code in a static ram 190 and 194 in a table of information for that particular receiver 16."(page 27, lines 23-25) "The arbitrators transmits signals corresponding to these start and stop events to the computer 2."(page 11, lines 15-16) "The operating software of the intelligent locator computer operates to read into the computer memory the start and stop events from the intelligent locator arbitrator's 6, time stamps the events, and stores the data of the event in a relational database."(page 11, lines 21-25)

Claim 93. The system of claim 92, where said unique identity data stream comprises a stream of digitally pulsed infrared radiation consisting of 16 data bits framed by a pair of start bits and a stop bit.

"In Figure 4 a 20 millisecond time interval is depicted during which 14 infrared pulses, each identified by reference numeral 42, occur with an approximate 10 microsecond duration which is identified by reference numeral 44."(page 16, lines 3-8)

Claim 94. The system of claim 92, where each said transmitter unit transmits said identity data stream in a unique non-standard periodic pattern, such that no two said transmitter units transmit with identical periodic patterns.

"It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 10-15)

Claim 95. The system of claim 92, where said transmitter units transmit both vertically and horizontally.

"Diodes 84A and 84B..."(page 19, line 1)

Claim 96. The system of claim 92, where said transmitter unit microprocessor means is programmed to one of 65,535 possible said unique identity data streams.

"All the intelligent locator receivers associated with the various intelligent locator arbitrators are responsive to anyone of at least one but preferably a plurality of intelligent locator transmitter badges 18_1, 18_2, 18_3, 18_4- - -18_n, each of which, as will be described in greater detail hereinafter, transmits an unique bit code when chosen with bits 20 to enable up to 1,048,576

	badges uniquely recognizable by the system." (Page 10, lines 16-22)
Claim 97. The system of claim 92, where said receiver unit microprocessor means test each received said identity data stream for validity.	"The microcontroller 158 samples the input bursts to establish the validity of an identification code. The validation is made when the identification code consists of, as shown in Figure 4, a start pulse 46 followed by 10 pulses 48 representing a 20 bit code, followed by three pulses 50 representing a 6 bit checksum."(page 22, lines 20-25)
Claim 99. The system of claim 9 , where each said transmitter unit repeatedly transmits said identity data stream in a unique non-standard periodic pattern consisting of three transmissions with different time intervals between each of said three transmissions in said pattern, and where no two said transmitter units have identical time intervals between said three transmissions.	"To facilitate an understanding of the underlying principle of the present invention, reference is now made to the diagram of Figure 3 wherein there is illustrated timing diagrams in graphical form of three simultaneous infrared transmissions by three separate intelligent locator transmitters over a four second period. It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 5-15)
Claim 100. The system of claim 92, where each said transmitter unit repeatedly transmits said identity data stream once during successive predetermined time periods, with the time interval between each two successive transmissions differing from the time interval between the previous two successive transmissions.	"To facilitate an understanding of the underlying principle of the present invention, reference is now made to the diagram of Figure 3 wherein there is illustrated timing diagrams in graphical form of three simultaneous infrared transmissions by three separate intelligent locator transmitters over a four second period. It is an important and novel feature of the present invention that a pulse burst of 20 milliseconds duration defines a unique binary identification code that is transmitted approximately once a second with its position in time relative to the start of each second determined by an algorithm."(page 14, lines 5-15)

The microcontroller 158 stores the input bursts to establish the validity of the identification code (page 22, lines 20-25). While the microcontroller 222 of the arbitrator stores the identification code in static RAM, it is placed in a table of information for that particular receiver (page 27, lines 23-25). Thus, there is dedicated RAM for each receiver. Moreover, page 23, lines 20-23 discloses the sue of the microcontroller 158 as a storage for information returned from the arbitrators. Page 24, lines 14-17 describe particulars of the communication from the arbitrator to the microcontroller 158. Additional discussions of the communication between microcontroller 222 and each receiver is found beginning at page 25, line 26 through page 26, line 3. The argument in the rejection under §112 that Appellants' receiver will detect only one badge is an improper and illogical interpretation of Appellants' specification. Appellants teach the prevention of synchronization among an anticipated huge number of badges. The prevention of synchronization is to enable a receiver to detect, validate and store the presences of multiple badges. Claim 72 does not require the same site for the memory and detection. It is respectfully submitted to be immaterial with regard to claim 82 and 92 that identity information is stored remote to the receivers when it is the full function of the receivers that is served. The bit stream data does not materially differ from Appellants' disclosure and the claims. Regarding claim 75, 85 and 95, Appellants' discloses a light emitting diodes and the use of receivers in the ceilings and walls and this is submitted to meet the requirement for vertical and horizontal transmissions. In regard to claims 77, 87 and 97 are fed back to the receiver. With respect to claim 79, 89 and 99 the claim terminology was chosen differently than in Appellants disclosure. Appellants'

respectfully direct attention to the following detailed description from the specification in support of the belief that there is support for the claims rejected under §112.

> "As shown the microcontroller 222 communicates with the intelligent locator computer 2 by the RS-485 serial data bus 4 through uart 214 and the RS-485 interface integrated circuit 206. Additionally, the microcontroller 222 communicates with the intelligent locator receiver 16 by the RS-485 type serial data bus 8 through uart 216 and the RS-485 interface integrated circuit 208. The uarts 214 and 216 take the form of integrated circuits which receive parallel data from the microcontroller 222, convert the parallel data to serial data and output the serial data at a selected baud rate to the RS-485 interface integrated circuits 206 and 208. The uarts 214 and 216 also receive serial data at a selected baud rate from the RS-485 interface integrated circuits 206 and 208 and convert the serial data to parallel data read in by the microcontroller 222. Quartz crystals 210 and 212 form operating clocks for the uarts 214 and 216, respectively. The RS-485 interface integrated circuits 206 and 208 convert serial data outputs from the uarts 214 and 216, respectively, to differential outputs in lines 4A and 4B extending to the intelligent locator computer 2 with respect to IC 206 and lines 8A and 8B extending to the intelligent locator receivers 16 for transmission by way of twisted pair wire. The RS-485 interface integrated circuit 206 converts differential inputs received from twisted pair wires 4C and 4D from the intelligent locator computer to serial data inputs read by uart 214. The RS-485 interface integrated circuit 208 converts differential inputs received from twisted pair wires 8C and 8D from the intelligent locator receivers 16 to serial data inputs read by uart 216. The microcontroller 222 latches all its external control signals to the other integrated circuits on the intelligent locator arbitrators logic board 182 in two 8 bit latch integrated circuits 218 and 220. This enables the microcontroller 222 to expand its 8 bit data output port to drive 16 control signals. The microcontroller 222 also latches the address bus of the static rams 190 and 194 in two 8 bit latch integrated circuits 192 and 196. This enable the micro-controller to multiplex its 8 bit data bus with the 15 bit address bus of the static rams 190 and 194. Quartz crystal 224 forms an operating clock for the microcontroller 222.
>
> Each arbitrator 6 is connected by an RS-485 serial bus 8 to process signals from a maximum of preferably 32 intelligent locator receivers 16. Each arbitrator 6 operates to establish the event when a transmitter 18 is first detected by a receiver 16 and the event when a transmitter 18 is no longer detected by a receiver 16 and transmits such start and stop events as signals to the intelligent locator computer 2. The microcontroller 222 in each arbitrator 6 through operation of a resident program reads the identification codes reported by each intelligent locator receiver 16 by way of RS-485 serial bus 8. If an identification code transmitter 18 has been carried into the detection range of a receiver 16, the microcontroller 222 sends a start event message containing the identification code and an identification number of that receiver 16 to the computer 2 by the RS-485 bus 4. The microcontroller 222 also stores that identification code in a static ram 190 and 194 in a table of information for that particular receiver 16. As long as the receiver 16 continues

to report that identification code, the identification code remains in the static ram 190 and 194. However, when the intelligent locator stops a reporting of the identification code for more than 10 seconds, the microcontroller 222 sends a stop event message to the computer 2 and removes that identification code from the static ram 190 and 194 for that intelligent locator receiver 16. In the particular embodiment of the system shown in Figure 2, the microcontroller 222 also receives and stores in ram 190 and 194 a table of nurse level information from the intelligent locator computer 2.

The table of nurse level information includes a list of identification codes of the badges worn by nurses and the nurse level of each such person e.g., RN, LPN or aid. When an intelligent locator receiver 16 reports an identification code which corresponds to one of the nurse codes, the microcontroller 222 sends that nurse level information to that intelligent locator receiver 16 by the associated RS-485 serial bus 8. In this way, the receiver 16 is supplied with a signal to turn ON one of the nurse level light emitting diodes 120, 122 or 124 and at the same time to deliver a signal to the patient station 32 indicating the presence of a nurse and to which of the three levels the nurse belongs." Page 25, line 23 to page 28, line 21

For the foregoing reasons, the Appellants request that the rejection of Appellant's claims be overturned.

Respectfully submitted,

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MAIL CERTIFICATION

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Linda C. LaCone

Date February 8, 2001

APPENDIX "A"

49. A locating and monitoring system installable on the premises of a facility, said system including:

a plurality of transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow identification of such transmitter means at any of diverse sites in the facility, each of said transmitter means including means for transmitting infrared pulse bursts, each of said infrared pulse bursts defining a unique binary identification code comprising a plurality of binary bits of sufficient number that each of said transmitter means in said facility transmits a different binary identification code, means responsive to an algorithm for controlling said means for transmitting said infrared pulse bursts during a predetermined time interval, with the occurrence of each pulse burst in time relative to the start of each time interval varying from time interval to time interval, the amount of said varying being controlled by said means responsive to an algorithm incorporated in each transmitter using said unique binary identification code of that transmitter for preventing synchronization with other transmitters and with ambient periodic resident signals in the facility;

receiver means responsive to said pulse bursts by said plurality of transmitter means at each of said diverse sites in said facility for detecting infrared pulse bursts by said transmitter means; and

central means responsive to said receiver means for establishing the location of said transmitter means in said facility.

50. The system of claim 49 wherein said transmitter means includes a microcontroller responsive to said algorithm.

51. The system of claim 49 wherein said means for transmitting pulse bursts includes a microcontroller having memory containing said unique binary identification code.

52. The system of claim 51 wherein said microcontroller includes microcinary identification code, and said checksum.

53. The system of claim 49 wherein said identification code comprises at least 20 binary bits to provide at least 1,048,576 different identification codes.

54. The system of claim 49 wherein each pulse burst is of about 20 milliseconds in duration.

55. The system of claim 49 wherein said pulse bursts each occur once in the predetermined time interval of about one second.

56. The system of claim 49 wherein said receiver means responsive to said pulse bursts includes a microcontroller for executing microcode to establish a valid code burst from received pulse bursts.

57. The system of claim 49 wherein each pulse of said pulse bursts is transmitted by a 10 microsecond flash of infrared light.

58. The system of claim 49 wherein said receiver means responsive to code bursts includes a plurality of discrete receivers each having a reception range about a premises with an allowable overlap with the reception range of another of such receivers; each of said receivers being responsive to said pulse bursts to validate said binary identification code and thereby establish presence of said transmitter means within the reception range of a receiver.

59. The system of claim 58 wherein said central means includes gathering station means for validating outputs from each of said plurality of receivers and forming start and stop

events, said start events including the identity of the one receiver of said plurality of receivers, the binary identification code of one transmitter of the said plurality of the transmitters, and when the pulse bursts of such transmitter was detected by such receiver; said stop event including the identity of the one receiver of said plurality of said receivers, the unique identification code of the said one transmitter when loss of reception has occurred within the reception range, and when such loss of reception occurred.

60. The system of claim 59 wherein said gathering station means includes a plurality of gathering stations connected by a serial port to a central computer which includes a storage medium for storing said start and stop events derived from each of said plurality of gathering stations.

61. The system of claim 60 wherein said central computer includes a plurality of said serial ports, each of said ports being connected to a plurality of gathering stations for receiving said start and stop events.

62. The system of claim 61 wherein said central computer has a interface including a terminal and a keyboard for a user to request and receive the location of any of said transmitter means.

63. The system of claim 62 further including display means responsive to said central computer for assembling reports, and means to input commands to said central computer by an authorized operator to assemble said reports of movements of any of said transmitter means recorded and stored in said storage medium.

64. The system of claim 63 for tracking the movements of hospital personnel and allied hospital equipment, and interfacing to an existing nurse call hospital system by providing:

that each of said plurality of said transmitter means comprises a portable communication badge worn by allied hospital personnel, including nurses, and attached to said hospital equipment; said means for establishing the location including a receiver installed in each patient room to interface with said nurse call hospital system; a receiver installed in each patient room for indicating when said allied hospital personnel wearing one of the said badges enters the room, and the class of a number of classes to which the allied hospital personnel belongs; and an interface between said central computer and said nurse call hospital system such that location queries entered at terminals of said hospital system are routed to said central computer.

65. A stationary receiver installable on the premises of a facility in combination with at least one transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow monitoring of such transmitter means within any of diverse sites in the facility, said transmitter means including infrared emitter means controlled by controller means for emitting infrared pulses, an algorithm unique to and with that transmitter means for controlling said controller means for producing emissions of infrared pulse bursts by said infrared emitting means for defining a unique binary identification code at diverse times during each of predetermined time intervals, said algorithm controlling said controller means for causing each pulse burst in each successive time interval relative to the start of each of the successive time intervals to occur differently from time interval to time interval, said stationary receiver including means for detecting infrared transmissions of said pulse bursts and means responsive to said means for detecting for producing an electrical signal identifying said transmitter means.

66. The stationary receiver of claim 65 wherein said pulse bursts include a pulse

position scheme to represent at least two binary bits of the identification code with one pulse for reducing the number of pulses required to represent said unique binary identification code.

67. The stationary receiver of claim 65 wherein said pulse bursts include an error detection word with said binary identification code and wherein said means for receiving is responsive to said error detection word to insure integrity of reception of pulse bursts.

68. The stationary receiver of claim 67 wherein said error detection word is transmitted according to a pulse position scheme wherein at least two binary bits of the error detection word are represented with one pulse.

69. The stationary receiver of claim 67 wherein said error detection word is a binary checksum.

70. The stationary receiver of claim 67 further including means for recalculating said error detection word using the received binary identification code and means for comparing such recalculated error detection code with said received error detection code to validate an error free pulse burst reception.

71. The stationary receiver of claim 65 wherein the means of receiving includes a microcontroller for executing microcode to establish a valid code burst from received pulse

72. A locator system comprising a number of individual portable transmitter units, a number of individual stationary receiver units, and central data processing means;

said transmitter units each comprising infrared transmission means and programmable microprocessor means remotely separated from said central data processing means such that each said receiver unit has the capability to store multiple said unique identity data streams received from multiple said transmitter units and can communicate said identity data

streams to said central data processing means.

73. The system of claim 72, where each said unique identity data stream comprises a stream of digitally pulsed infrared radiation consisting of 16 data bits framed by a pair of start bits and a stop bit.

74. The system of claim 72, where each said transmitter unit transmits said identity data stream in a unique non-standard periodic pattern, such that no two said transmitter units transmit with identical periodic patterns.

75. The system of claim 72, where said transmitter units transmit both vertically and horizontally.

76. The system of claim 72, where said transmitter unit microprocessor means is programmed to one of 65,535 possible said unique identity data streams.

77. The system of claim 72, where said receiver unit microprocessor means test each received said identity data stream for validity.

79. The system of claim 72 where each said transmitter unit repeatedly transmits said identity data stream in a unique non-standard periodic pattern consisting of three transmissions with different time intervals between each of said three transmission in said pattern, and where no two said transmitter units have identical time intervals between said three transmissions.

80. The system of claim 72, where each said transmitter unit repeatedly transmits said identity data stream once during successive predetermined time periods, with the time interval between each two successive transmissions differing from the time interval between the previous two successive transmissions.

82. A locator system comprising a number of individual portable transmitter units, a number of stationary individual remote receiver units, and a central data processing means;

said transmitter units each comprising infrared transmission means and programmable microprocessor means such that a unique identity data stream is transmitted by each transmitter unit;

said individual remote receiver units each comprising a single infrared receiving means and a single programmable microprocessor means, such that the total number of said programmable microprocessor means is equal to the total number of said individual remote receiver units in said locator system, such that each said individual remote receiver unit has the capability to store multiple said unique identity data streams received from multiple said transmitter units and can communicate said identity data streams to said central data processing means.

83. The system of claim 82, where said unique identity data stream comprises a stream of digitally pulsed infrared radiation consisting of 16 data bits framed by a pair of start bits and a stop bit.

84. The system of claim 82, where each said transmitter unit transmits said identity data stream in a unique non-standard periodic pattern, such that no two said transmitter units transmit with identical periodic patterns.

85. The system of claim 82, where said transmitter units transmit both vertically and horizontally.

86. The system of claim 82, where said transmitter unit microprocessor means is programmed to one of 65,535 possible said unique identity data streams.

87. The system of claim 82, where said receiver unit microprocessor means test each received said identity data stream for validity.

89. The system of claim 82, where each said transmitter unit repeatedly transmits said identity data stream in a unique non-standard periodic pattern consisting of three transmissions with different time intervals between each of said three transmissions in said pattern, and where no two said transmitter units have identical time intervals between said three transmissions.

90. The system of claim 82, where each said transmitter unit repeatedly transmits said identity data stream once during successive predetermined time periods, with the time interval between each two successive transmissions differing from the time interval between the previous two successive transmissions.

92. A locator system comprising a number of individual portable transmitter units, a number of stationary individual remote receiver units, and a central data processing means;

said transmitter units each comprising infrared transmission means and programmable microprocessor means such that a unique identity data stream is transmitted by each transmitter unit;

said individual remote receiver units each comprising a paired single infrared receiving means and single programmable microprocessor means, said single programmable microprocessor means being in communication with only one said individual remote receiver unit, such that each said individual remote receiver unit has the capability to store multiple said unique identity data streams received from multiple said transmitter units and can communicate said identity data streams to said central data processing means.

93. The system of claim 92, where said unique identity data stream comprises a stream of digitally pulsed infrared radiation consisting of 16 data bits framed by a pair of start bits and a stop bit.

94. The system of claim 92, where each said transmitter unit transmits said identity data stream in a unique non-standard periodic pattern, such that no two said transmitter units transmit with identical periodic patterns.

95. The system of claim 92, where said transmitter units transmit both vertically and horizontally.

96. The system of claim 92, where said transmitter unit microprocessor means is programmed to one of 65,535 possible said unique identity data streams.

97. The system of claim 92, where said receiver unit microprocessor means test each received said identity data stream for validity.

99. The system of claim 92, where each said transmitter unit repeatedly transmits said identity data stream in a unique non-standard periodic pattern consisting of three transmissions with different time intervals between each of said three transmissions in said pattern, and where no two said transmitter units have identical time intervals between said three transmissions.

100. The system of claim 92, where each said transmitter unit repeatedly transmits said identity data stream once during successive predetermined time periods, with the time interval between each two successive transmissions differing from the time interval between the previous two successive transmissions.

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02/08/2001	Bill	20259-14	445.00	445.00		445.00
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Date	Type	Reference	Original Amt.	Balance Due	Discount	Payment
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